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ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Research Article

EVALUATION ON THE SEED GERMINATION RATE OF *ASHOKA* (*SARACA ASOCA* (ROXB.) DE WILDE) WITH SPECIAL REFERENCE TO *VRIKSHAYURVEDA*

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ABSTRACT

Ashoka (*Saraca asoca* (Roxb.) de Wilde) is one of the most auspicious plant mainly for females belonging to family Fabaceae. The stem bark is the widely used in several Ayurvedic preparations such as '*Ashokarishta'* which is prescribed in leucorrhoea, haematuria, menorrhagia and other gynecological disorders. It is getting "endangered" due to over exploitation and enormous use of its bark. Because of destructive means of extraction and the absence of an organized cultivation programs, the availability of the crude drug is diminishing and this has resulted in substitution and adulteration. It affects the Good Manufacturing Practices and resulting in deprived quality of the product which leads to hamper its efficacy. Subsequently it is a need of hour, to cultivate it in large extent, which is getting deprived because of its slow growth rate, seed dormancy and low germination rate. The present study was conducted to overcome this problem with the help of one of the method described in *Vrikshayurveda*.

In this study, seed germination of *Ashoka* is carried out by three different methods i.e., conventional method, H_2SO_4 method and *Vrikshayurveda* method. Out of which Germination rate of *Ashoka* seeds was maximum (38%) with conventional method minimum (6%) with *Vrikshayurveda* method and (24%) with H_2SO_4 treatment. In view of observations, methods like conventional and $H_2SO_4$are more effective than the *Vrikshayurveda* for good germination of seeds of *Ashoka*. The low germination rate in *Vrikshayurveda* may be due to the limited description of methodology described in *Vrikshayurveda* with respect to quantity of cow milk, cow dung, honey, and *Vidanga* powder and time period for soaking seeds in cow milk, rubbing of cow dung and application of *Vidanga* and honey with respect to procedure. It should be studied in detail so as to get scientific insight of ancient methods of *Vrikshayurveda*, may prove its important with respect to maximum germination rate and healthy growth of plants.

KEYWORDS: *Saraca asoca,* Germination rate, *Vrikshayurveda.*

INTRODUCTION

Ashoka (*Saraca asoca*(Roxb.) De. Willd.) is an one of the sacred plants of Hindus belongs to family Fabaceae. As we know that *Ashoka* is the main plant useful in gynecological disorders. The estimated demand of *Ashoka* bark is in excess of 2000 million tons, however, the availability in the wild is extremely rare.[1] Over exploitation results in vulnerability of *Ashoka* species. Therefore, the cultivation of *Ashoka* plants is the key to meeting authentic and genuine raw material. There are various measures for plantation like, plantation through seed, stalk, bulb, etc. can be adopted, and out of which plantation by seed is the reliable and easy method of plantation because seed itself is the cause of perpetuating the continuity of plant kingdom.[2] For healthy and disease free plants, vigorous and phenotypically superior seed with no physical damage and having good viability are required because in the germination of seed various factors affects like moisture, temperature, oxygen, light, substratum, food availability, dormancy, etc. Due to such factors seed germination rate got declined. Out of which seed dormancy is the most critical problem. As it is evident that there is a great scope to integrate traditional practices mentioned in *Vrikshayurveda* for better productivity of quality plant material. [3]

Vrikshayurveda is the traditional Indian science of plant life that describes theory and practices to generate healthy plants that produce yield of superior quality. It is the way forward for organic production of seedlings as well as large scale cultivation of medicinal plants, horticultural crops, vegetable crops and grains. These will help not only in production of organic and healthy produces, but also in maintaining a healthy environment.

As there are some problems found in cultivation of *Ashoka* are, it has a very low germination rate, slow growth rate, the thin seed coat which many times results in separation of cotyledons. To overcome the above problems and to find an amicable solution, the present study was conducted by comparing conventional methods with that of *Vrikshayurveda*. In this study is based on one of the formula given in the book of *Vrikshayurveda* for good sprouting, germination and vigor, which is as follows "Seeds to be sprinkled with milk, smeared with cow dung, dried smeared profusely with *Vidanga* and honey. Such seeds definitely sprout."[4][5]

MATERIALS AND METHODS

Collection of seeds

Fresh seeds of *Ashoka* were collected from Pune (Maharashtra) and Mangalore (Karnataka) in the month of July, the rainy season of 2015

Collection of *Godugdha, Gomaya, Madhu*, and *Vidanga*

Fresh *Godugdha* (cow milk) and fresh *Gomay* (cow dung) were collected from nearer sources, *Madhu* (Honey) was collected from forest of *Gadchiroli*, due to unavailability of *Embelia ribes* Burm. f., fruits of *Embelia robusta* Roxb. was taken as a substitute. The original sample of (*Embelia robusta* Roxb.) was collected as a field sample from Joginder Nagar of Himachal Pradesh. Fruit powder of *Vidanga* was made in pharmacy.

Other Materials

Black polythene bags filled with soil, various glass wares like conical flasks, test tubes, measuring flasks, pipettes, petri dishes, clay pots, distilled water, filter paper.

Identification and Authentication of *Ashoka*

The plants were identified and authenticated from FRLHT (Foundation of revitalization of local Health Traditions, Banglore). The herbarium specimen [FRLH 119704] is confirmed as *Saraca asoca* (Roxb.) Willd. of family Leguminosae.

Method used for formation of 0.1N Sulfuric acid by Conc. H_2SO_4

3 ml of Conc. H_2SO_4 was mixed with 500 ml of distilled water, after shaking well 447 ml of distilled water was added to it to form 1000 ml of H_2SO_4 of (0.1N) strength. After preparing 0.1N of H_2SO_4, the pretreatment was given to *Ashoka* seeds.

Sample size of seeds for germination rate

50 seeds of *Ashoka* in each group respectively were taken to access the germination rate and growth performance upto 2 months. The seed treatment of *Ashoka* was divided into following three groups-

Group A - Conventional Method

Group B - H_2SO_4 treated Method

Group C- *Vrikshyurveda* Method

Procedures for selection of *Ashoka* seeds

Randomly collected seeds of *Ashoka* were kept in water; seeds which were floating on the water surface were discarded and replaced by same number of seeds. The seeds that remained at the base were taken for seed germination procedure.

Procedures for seed germination of *Ashoka*

I. Conventional Method (Group A)

In this method, *Ashoka* seeds were soaked in distilled water for 24 hours in a pot and then they were placed in soil filled black polythene bags and soil was spread over them.

II. Sulfuric acid treatment method (H_2SO_4) (Group B)

In this method, *Ashoka* seeds were treated with 0.1N Sulfuric acid for 5-7 minutes, then washed with hot water and they were put on moist filter paper backed with cotton wool in petri dishes. Distilled water was used for moistening, and then they were placed in soil filled black polythene bags and spread with soil above.

III. *Vrikshayurveda* Method (Group C)

After floating test, seeds of *Ashoka* were soaked in about ½ liter of cow milk for 24 hours in a clay pot. After 24 hours, seeds were taken out and washed by water. Then they were rubbed with cow dung and pasted with 50ml of honey and 20-30 grams of *Vidanga* (*Embelia robusta* Roxb.) powder. They were then placed in soil filled black polythene bags and soil was spread over them.

Formula for seed germination rate[6][7]

Germination percentage was calculated according to the equation ISTA (Indian Seed Testing Association).

$$\text{Germination (\%)} = \frac{\text{Number of seed germinated} \times 100}{\text{Number of seeds on tray}}$$

Germination Period (GP)[8]

Germination period is the time between the first germination and the end of germination according to Berrie.

Formula for Seedling Vigor Index (SVI)[9]

The Seedling Vigor Index was calculated according to Hangarter formula-

$$\text{Seedling Vigor Index} = \frac{\text{Seedling length(cm)} \times \text{germinated \%}}{10}$$

OBSERVATION AND RESULTS

Selection of Seeds

Table 1: Water floating test for *Ashoka* seeds

Ashoka seeds	Floated seeds out of 50	Seeds remaining at the base out of 50	Number of replaced seeds
(A)	4	46	4
(B)	6	44	6
(C)	4	46	4

Germination Period

Table 2: Time to germinate: i.e. the time for the first germination to appear

Ashoka	No. of days to germinate 1st seed
Group A	15
Group B	15
Group C	52

Germination rate

Table 3: Germination rate of *Ashoka* (Plate 1, 2, 3, 4)

Sr. No.	Treatment	*Ashoka* (Group)		
		(A)	(B)	(C)
1.	**No. of seeds planted**	50	50	50
2.	**No. of seeds that germinated**	19	12	3
3.	**Fraction of seeds that germinated**	19/50	12/50	3/50
4.	**Fraction with denominator of 100**	38/100	24/100	6/100
5.	**Percentage of seeds that germinated**	**38%**	**24%**	**6%**

DISCUSSION

Availability of authenticated crude drug is a big challenge today. More than 90% of the species used in trade continue to be sourced from the wild of which about 2/3rd are harvested by destructive means. Therefore the cultivation of medicinal plants is the key to meeting the raw material needs of the Ayurvedic pharma-industry. With this view of organic cultivation to grow healthy and numerous plants, there are various methods given in *Vrikshayurveda*. For healthy and fast germination, one of the method from *Vrikshayurveda* was chosen. The main reason behind selection of this method is availability of ingredients and its beneficial effects on growth of plants.

For exploring facts and factual, *Ashoka* (*Saraca asoca* (Roxb.) De.Willd.) with very low germination and slow growth rate was selected and experiment was designed. This plant has immense potential and medicinal properties but it is always short of supply. This leads to its adulteration and hence is not suitable for human consumption. Present study hence will prove a boon to enhance their growth. So that ample, authentic material is made available for his usage for mankind.

As *Ashoka* is having very thin seed coat, but there is an unknown dormancy and the seeds remain viable only for 2 months which results in 58 to 100 % germination in humid or coastal area. In other regions of India the germination percentage is declined.

To overcome this problem the present study was conducted to evaluate the germination rate of *Ashoka*. It was studied on the basis of following points:

Seed Dormancy

Seed dormancy means where the embryo remains dormant for a temporary period. This stage is necessary for maturation of embryo and also for preservation. This is one of the significant features of dormancy. The seeds with a thick, hard seed coat required special treatment to break dormancy. In general, plants with tree habitat produce seeds during late spring and germinate only on onset of rainy season. But in case of *Ashoka* seeds are having very thin and not so hard seed coat, still it requires minimum 15 days and maximum 3 months after ripening effect.

Germination Percentage

There was a significant difference in germination rate with different treatments. However, the maximum germination percentage of *Ashoka* seeds (38%) was noticed in seeds germinated by conventional method. On the contrary, the minimum germination percentage (6%) was recorded by *Vrikshayurveda* method. Whereas the (24%) of germination rate was found in seeds treated with H_2SO_4(0.1 N).

Germination period

After careful observation it was seen that the germination period for the germination of first seed was 15 days in conventional group of *Ashoka* from the date of sowing. The last seed of *Ashoka* was germinated in conventional group and *Vrikshayurveda* group around 90 days after sowing.

Seedling Vigor Index

In *Ashoka*, the highest seedling vigor index (10.26) was recorded in seeds treated with conventional method while the lowest seedling vigor index (0.78) was found in *Vrikshayurveda* method. The seedling vigor index (4.2) was found in conventional group of *Ashoka*.

CONCLUSION

The lower germination rate in *Ashoka* seen in *Vrikshayurveda* method as compared to conventional and H_2SO_4 method, may be due to the limited description of methodology in the book of *Vrikshayurveda* with respect to quantity of cow milk, cow dung, honey, and *Vidanga* powder and time period for soaking seeds in cow milk. The following were problems faced during the research work which may lead to deprived results as compared to conventional and H_2SO_4 methods.

The seeds of *Ashoka* collected from Pune (Maharashtra) were small and not viable due to improper habitat, which may be the reason for difference in result. The seeds from Mangalore (Karnataka) were big and having more viability but some seeds were damaged due to high moisture content and physical trauma.

Treatment of cow milk to both type of seeds resulted in souring of milk which may be one of the major reason for very low germination rate as the proper quantity of cow milk and exact time period for retaining of seeds in cow milk was not mentioned in *Vrikshayurveda*. Similarly sprinkling of milk is mentioned but the rationality behind this procedure is not clear, therefore it was decided to place *Ashoka* seeds in cow milk for 24 hours which may affect the germination of seeds probably.

Hence prior to studying the methods enumerated in *Vrikshayurveda* regarding germination, it is our duty and need to develop its standard operating procedures for sprinkling, rubbing and application with respect to procedure, quantity and time should be studied in detail so as to get scientific insight of ancient methods this may prove to be important in contemporary era.

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Cite this article as:
Shahane Prachi, Khobragade Pramod. Evaluation on the Seed Germination Rate of Ashoka (Saraca Asoca (Roxb.) De Wilde) with special reference to Vrikshayurveda. International Journal of Ayurveda and Pharma Research. 2016;4 (10) :29-32.
Source of support: Nil, Conflict of interest: None Declared

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